EXHIBIT A

United States District Court
Eastern District of New York

1:19-cv-00768-BMC

Lashawn Sharpe, individually and on behalf of all others similarly situated

Plaintiff

- against -

A & W Concentrate Company and Keurig Dr Pepper Inc.

Defendant

Expert Report of
Dr. Daphna Havkin-Frenkel

I. INTRODUCTION AND PURPOSE

1. I have been engaged as an expert by Plaintiff's counsel in this case.

2. I provide this report in connection with the case filed by Plaintiff against Defendants A& W Concentrate Company and Keurig Doctor Pepper ("Defendants").

3. I have been advised by counsel for Plaintiffs that individuals purchased Defendants' A&W Root Beer and A&W Cream Soda beverages ("Products") believing the vanilla flavoring came from real vanilla and was aged vanilla.

4. I have been further advised that Plaintiffs allege these claims are false, misleading, and/or deceptive to a reasonable consumer because the vanilla flavoring of the products is, in part, not from real vanilla.

5. Counsel for Plaintiffs asked me to provide an expert opinion on: (1) the source of the vanilla flavor of the Products, (2) the presence of flavor compounds obtained from real vanilla beans in the Products and (3) whether the claim "Made With Aged Vanilla" ("Challenged Claim") is truthful or not:[1]

[1] See complaint (ECF No. 1) (hereafter "the Complaint"), paragraph 14.

6. It is my opinion that the source of the vanilla flavor in the Products is not from vanilla.

7. It is my opinion that the presence of vanilla obtained from vanilla beans in the Products is not present and if it is present, it is at miniscule levels.

8. It is my opinion the claim "Made With Aged Vanilla" is untrue.

9. My opinions are based on my experience and training as well as the case-specific materials I have reviewed, summarized in Exhibit 3 and cited throughout this Report.

10. Plaintiff's Counsel are compensating me for my time at my standard hourly rate of $250.00, plus direct costs.

11. My compensation is not dependent on the opinions I express or on the outcome of the case.

II. QUALIFICATIONS[2]

12. I am the General Manager of Bakto Flavors LLC.

13. Bakto Flavors is a company specializing in the production and marketing of vanilla products and other natural flavors and extracts, to consumers and businesses.

14. I am also a visiting research scientist in the Department of Plant Biology, Rutgers, the State University of New Jersey ("Rutgers").

15. The research program at Rutgers focuses on analyzing the biosynthetic pathway of vanillin in vanilla beans and microorganisms, in addition to examination of the curing process, post-harvest handling and green house cultivation of vanilla beans.

16. I have authored numerous articles on vanilla in peer reviewed scientific journals and

[2] See Exhibit 1 for my curriculum vitae, published works, and speeches and Exhibit 2 for my testimony experience.

the trade press (i.e., Perfumer & Flavorist).

17. I am the editor, with F.C. Belanger, of the Handbook of Vanilla Science and Technology (2017) and Biotechnology in Flavor Production (2016), published by Wiley-Blackwell and Blackwell Publishing, respectively.

18. While my formal academic training is in the sciences, I have experience in the flavor industry in various capacities, as a flavor chemist.

19. This industry experience in addition to my academic training have provided me the knowledge of what particular compounds are used in the flavor industry to create or simulate flavors typically associated with various food and beverage products.

20. Plaintiff's Counsel stated they had filed the present action and requested my opinion with respect to the truthfulness of the Claims.

21. I am aware that Plaintiff's Counsel commissioned a GC-MS analysis of the Products by Alliance Technology Group ("Alliance Tech"), in Monmouth Junction, New Jersey.

22. On August 27, 2019, Alliance Tech provided Plaintiff's Counsel and me their report, "Analysis of A&W Root Beer and Cream Soda for Vanilla Flavors by GCMS / R20190173" ("Alliance Tech Report").

III. Application of Gas Chromatography–Mass Spectrometry ("GC-MS") to Samples

23. GC-MS is an analytical method that combines the features of gas-chromatography and mass spectrometry to identify different substances within a test sample.

24. The gas chromatograph separates components in a mixture into individual molecules, using a capillary column with certain length, thickness and defined properties of a stationary phase.

25. The mixture components are injected into and travel through the column being eluted at different times ("retention time"), shown on the x-axis.

26. The y-axis measures the amount or "intensity" of the specific compounds in the sample.

27. The elution of the compounds is plotted against their peaks in a chromatogram, a graph used to display scientific results obtained through gas chromatography.

28. As the molecules are eluted, they are captured by the mass spectrometer.

29. The molecules are broken down into ionized fragments and their mass-to-charge ("M/Z") ratio is calculated.

30. The M/Z ratio is similar to a fingerprint of the molecules, which is compared against the M/Z ratios for all other known compounds to obtain a match.

31. Each compound is identified by a peak, and the relative area covered by a peak is proportional to its amount in the sample.

32. The Alliance Tech Report presents chromatograms for the Root Beer and Cream Soda Products.

33. The compounds detected are identified in the "Name" column, with their relative proportions shown in the "Area%" column.

IV. GC-MS FAILS TO REVEAL MARKERS FOR NATURAL VANILLA

34. The four (4) major chemicals found in vanilla beans which are common markers for real vanilla are identified in the table below, in the proportions indicated.

Chemicals	Percent Present in Vanilla Beans
vanillin	1.3-1.7 %
p-hydroxybenzaldehde	0.1%
vanillic acid	0.05%
p-hydroxybenzoic acid	0.03%

35. While vanillin is the chemical most associated with natural vanilla, most of this

compound used in food and beverage products is not obtained from vanilla beans.

36. Artificial processes transform natural source material such as clove oil and ferulic acid into most vanillin used today.

37. Based on my experience in the flavor industry, I am aware that vanillin from non-vanilla bean natural sources is frequently used to simulate the taste and flavor of vanillin which is obtained from vanilla beans.

38. Due to the similar chemical profiles of vanillin from vanilla beans compared to vanillin derived from non-vanilla bean, natural sources, the presence or absence of the three (3) other chemicals is relevant to my conclusions.

V. SUMMARY OF CONCLUSIONS

A. None of the Four Vanilla Markers are Detected in the Root Beer Products

39. The Peak Report TIC and chromatogram for the Root Beer Products fails to indicate the presence of any of the four (4) chemicals which are common markers for vanilla. *See* Alliance Tech Report, pp. 4-5.

40. To the extent the Root Beer Products may taste similar to the flavor imparted by vanilla beans, this is likely due to the presence and relative amount of ethyl vanillin, covering an area of 0.71%. *See* Alliance Tech Report, p. 5, Row 15, Column 4.

B. The Cream Soda Products Reveal Vanillin, Though the Absence of Three Other Markers Raises Questions as to the Vanillin Source Material

41. In contrast to the Root Beer, the Peak Report TIC and chromatogram for the Cream Soda Products reveal the presence of vanillin. See Alliance Tech Report, p. 6.

42. However, the data show no detection of the other three markers for real vanilla – p-

hydroxybenzaldehyde, p-hydroxybenzoic acid and vanillic acid.

43. I next sought to consider whether the vanillin detected is likely to be from natural vanilla.

44. The proportion of ethyl vanillin in the Cream Soda Products is more than ten (10) times the vanillin content, based on the relative area covered by their respective peaks – 4.61% to 0.29%. *See* Alliance Tech Report, p. 6, Rows 7-8, Column 4.

45. In light of the relative amounts of vanillin and ethyl vanillin, I reviewed the Krueger Report and Exhibits. *See* Document 2, Report of Dana Krueger, August 1, 2019; Document 3, Exhibit 1 to Report of Dana Krueger, Givaudan, Product Information Material Disclosure, May 20, 2019; and Document 4, Exhibit 2 to Report of Dana Krueger, Firmenich Flavours, Product Description PD PD C28104-1.1EN, 2-Fold Vanilla Extract and Ingredient Breakdown, April 30, 2009.

46. The Krueger Report is partially based on the vanilla flavor ingredient provided to Mr. Krueger for analysis.

47. Though I have not been provided the vanilla flavor ingredient for analysis, Mr. Krueger indicated this was the "Vanilla Flavor WONF" identified in the Product Information Material Disclosure. See Krueger Report, p. 4 and Exhibit 1 to Krueger Report.

48. Mr. Kruger noted that the vanilla flavor ingredient "has been fortified with added vanillin." See Krueger Report, p. 5.

49. When vanillin is added to "spike" or fortify a vanilla flavor, the vanillin used is not obtained from vanilla beans, but from non-vanilla bean source material identified above.

50. This may explain why the Peak Report for the Cream Soda Products reveals the presence of vanillin yet fails to detect any amount of p-hydroxybenzaldehyde, p-hydroxybenzoic

acid or vanillic acid.

C. The "Aged Vanilla" Claim Conflicts with the Analysis and the Kramer Report

51. The only reference to the "Aged Vanilla" Claim, other than in the Complaint, is in the Report of Steven Kramer, August 1, 2019 ("Kramer Report"), which states:

> A&W Root Beer and A&W Cream Soda contain aged vanilla, which is another way of saying natural vanilla, which is used as a flavoring in the form of vanilla extract. The vanilla flavor of vanilla beans is optimized by aging the green beans directly after they are picked.
>
> Kramer Report, p. 2.

52. However, this "aging" of green vanilla beans (over 3 to 6 months) refers to the standard "curing" process, a series of steps during which complex chemical reactions occur within the pods to release their flavor.

53. The first step, "killing," entails the submersion of the beans in scalding water to stop their vegetative growth and stimulate enzymatic reactions responsible for the vanilla aroma.

54. In the intermediate steps, the vanilla beans spend nights in "sweat boxes" and days spread in the sun.

55. The final conditioning step consists of storage of the vanilla beans in closed boxes to develop their flavor.

56. What is known as "aged vanilla" or "aging" of vanilla, as known in the trade, refers not to the standard curing steps, but to the process whereby after the vanilla flavor has been extracted from vanilla beans to form the liquid known as vanilla extract, it is aged for a finite period of time – often no less than three (3) months – in wooden barrels or casks.

57. During this aging period, the alcohol interacts with the wooden particulates, enhancing the flavor of the vanilla.

58. The aging process smooths out the complex vanilla flavors and increases the intensity of the flavors, resulting in a more expensive, higher quality and more valuable product.

59. It is my opinion that the Alliance Tech Report does not indicate the presence of vanilla, such that they cannot contain "Aged Vanilla."

60. Even if the Products contained markers for natural vanilla, they would still not contain "Aged Vanilla."

61. This is because (i) the definition for this term supplied by the Kramer Report does not distinguish "Aged Vanilla" from standard vanilla made through the typical processes and (ii) "Aged Vanilla" often has a specific meaning and connotation relating to the vanilla extract's storage in barrels or casks.

VI. **RESERVATION OF RIGHTS**

62. I understand that discovery in this case is ongoing.

63. I may amend or supplement my opinions to take into account facts developed in the discovery process.

Dated: September 19, 2019

Respectfully submitted,

Daphna Havkin-Frenkel, Ph.D.

Exhibit 1

Analysis of A&W Root Beer and Cream Soda for Vanilla Flavors by GCMS / R20190173

Prepared for:
Spencer & Associates, P.C.
Great Neck, NY

August 27, 2019

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CHEMICAL & MATERIAL TESTING LABORATORIES
www.alliancetechgroup.com
info@alliancetechgroup.com
732.355.1234 (ph)

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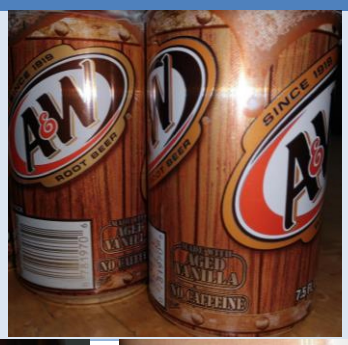
www.alliancetechgroup.com
9 Deer Park Drive ~ Suite B
Monmouth Jct., NJ 08852
info@alliancetechgroup.com

Client & Sample Information

Client:	Sheehan & Associates, P.C. 505 Northern Blvd. Suite 311 Great Neck, NY 11021
Requestor:	Spencer Sheehan
Study:	Analysis of A&W Root Beer and Cream Soda for Vanilla Flavors by GCMS
LIMS #:	20190173

Two (2) soda samples were purchased from Giant Food Stores on August 11, 2019 and analysed by Gas Chromatography-Mass Spectrometry (GC-MS) to assay for vanilla flavors (Vanillin and Ethyl Vanillin). The samples were designated as follows in the laboratory information management system (LIMS, Table I) and stored at room temperature in their original containers until being prepared for analysis.

Table I: Sample Designations

LIMS #	Client ID	
20190173-01	A&W Root Beer 7.5 FL OZ Can	
20190173-02	A&W Cream Soda 2 Liter Bottle	 

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info@alliancetechgroup.com

Summary

The chromatograms and peak tables for Samples 20190173-01 (A&W Root Beer) and 20190173-02 (A&W Cream Soda) are shown in Figures 1 and 2, respectively. Chemical matches for each peak were tabulated from mass-spectral library searches. Ethyl vanillin was detected in Sample 20190173-01 (A&W Root Beer). Vanillin and Ethyl Vanillin were detected in Sample 20190173-02 (A&W Cream Soda).

Experimental

A 40 mL aliquot of each soda sample was placed in a 50 mL centrifuge tube. The samples were spiked with 400µg of naphthalene-d8, which was used as an internal standard (IS) for the analysis. A total of 5 mL of Dichloromethane (DCM) was added to the samples. Each sample was centrifuged for 30 minutes at 2500-3000 rpm. The dichloromethane layer was isolated and transferred to a conical flask. The DCM extracts were then concentrated using a stream of dry nitrogen gas. Sample 20190173-01 was concentrated down to 0.2 mL and Sample 20190173-02 was concentrated down to 1 mL. The extracts were then placed in autosampler vials for analysis by GCMS.

The samples were analyzed on a Shimadzu QP2010SE GC equipped with a Supelco Equity-5 column (30m x 0.25mm x 1.0um). The oven program heated the samples from 50°C to 260°C at a ramp rate of 10°C/min. Helium was used as the carrier gas at a constant pressure of 20 psi. The MS detector was scanned from 35 to 350 m/z during analysis.

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Figure 1: Chromatogram and Peak Table for Sample 20190173-01 (A&W Root Beer 7.5 FL OZ Can)

Alliance Technologies, LLC
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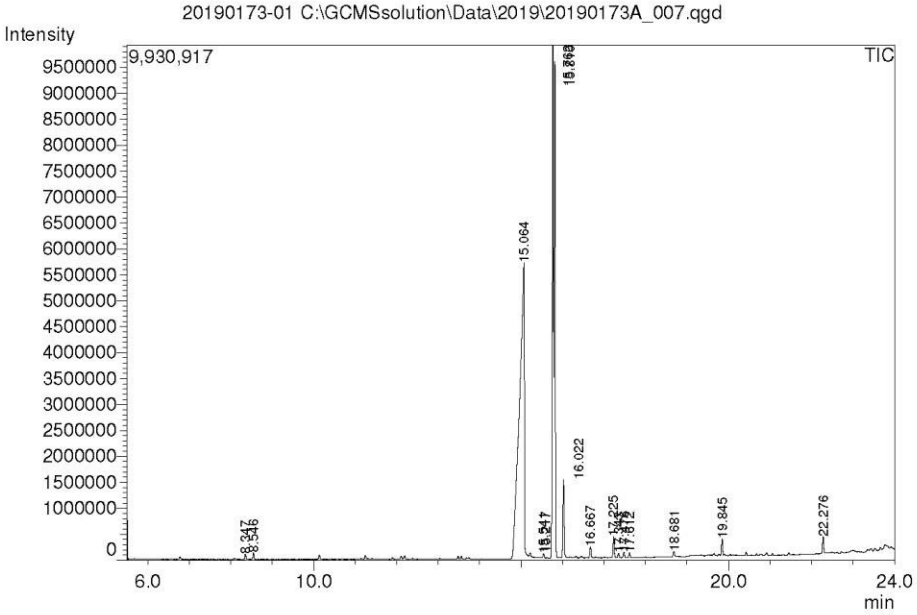
Sample Information

Analyzed by	: Admin
Analyzed	: 8/22/2019 3:38:16 PM
Sample Name	: 20190173-01
Sample ID	: Root Beer
Tray	: Tray2
Vial #	: 3
Inj. Volume	: 1
Data File	: C:\GCMSsolution\Data\2019\20190173A_007.qgd
Method File	: C:\GCMSsolution\Data\Project1\Methods\Equity5_Vanillin_Assay.qgm
Tuning File	: C:\GCMSsolution\System\Tune1\Tuning Report 21Aug2019.qgt

20190173-01 C:\GCMSsolution\Data\2019\20190173A_007.qgd



Peak Report TIC

Peak#	R.Time	Area	Area%	Height	Height%	Base m/z	Name
1	8.347	172206	0.19	95213	0.33	96.00	Furfural
2	8.546	245162	0.27	126050	0.44	43.05	2,4-Dimethyl-1-heptene
3	15.064	46182658	50.86	5686044	19.82	105.00	Benzoic Acid
4	15.217	200568	0.22	82447	0.29	112.10	1,2,3,4-Tetrahydronaphthalene-d12
5	15.541	157493	0.17	82646	0.29	57.05	Dodecane
6	15.762	20026708	22.05	9888686	34.48	136.10	Naphthalene-d8
7	15.810	17766481	19.56	9573681	33.38	120.00	Methyl Salicylate
8	16.022	2818866	3.10	1497074	5.22	97.00	2-Furancarboxaldehyde, 5-(hydroxymeth
9	16.667	422503	0.47	213307	0.74	175.10	Benzene, 1,3-bis(1,1-dimethylethyl)-
10	17.225	769495	0.85	405526	1.41	148.05	Benzene, 1-methoxy-4-(1-propenyl)-
11	17.343	202010	0.22	90421	0.32	43.05	Isotridecanol-
12	17.476	249815	0.28	109942	0.38	43.05	1-Undecene, 7-methyl-
13	17.612	177347	0.20	93524	0.33	43.05	1-Undecene, 7-methyl- (CAS)
14	18.681	177336	0.20	93018	0.32	57.05	Hexadecane

C:\GCMSsolution\Data\2019\20190173A_007.qgd 1 / 19

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Figure 1, Cont'd: Chromatogram and Peak Table for Sample 20190173-01 (A&W Root Beer 7.5 FL OZ Can)

Alliance Technologies, LLC
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Monmouth Jct., NJ 08852
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Peak#	R.Time	Area	Area%	Height	Height%	Base m/z	Name
15	19.845	640212	0.71	328810	1.15	137.00	Ethyl Vanillin
16	22.276	600626	0.66	316055	1.10	157.00	Ethyl citrate
		90809486	100.00	28682444	100.00		

C:\GCMSsolution\Data\2019\20190173A_007.qgd 2 / 19

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Figure 2: Chromatogram and Peak Table for Sample 20190173-02 (A&W Cream Soda 2 Liter Bottle)

Alliance Technologies, LLC
9 Deer Park Dr. Suite B
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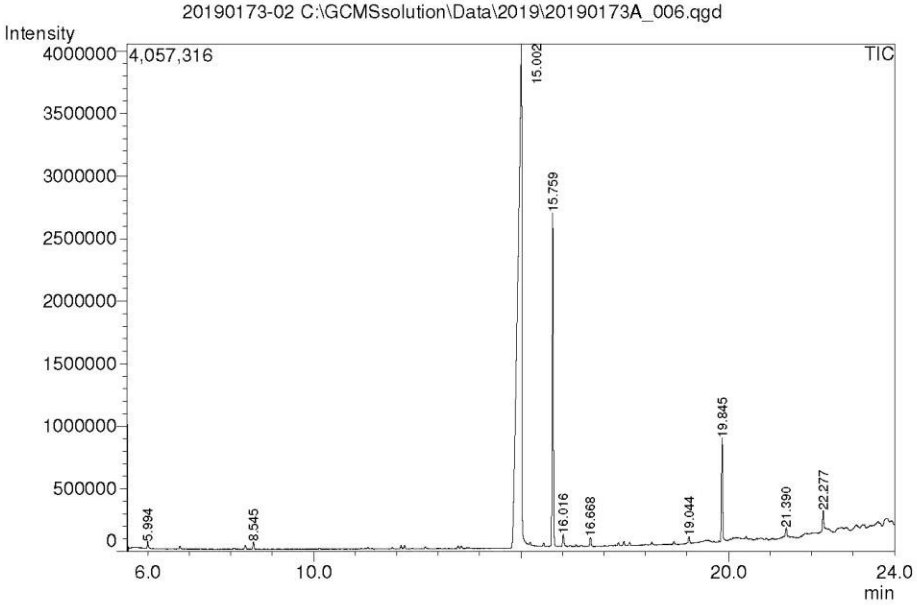
Sample Information

Analyzed by	: Admin
Analyzed	: 8/22/2019 2:59:23 PM
Sample Name	: 20190173-02
Sample ID	: Cream soda
Tray	: Tray2
Vial #	: 4
Inj. Volume	: 1
Data File	: C:\GCMSsolution\Data\2019\20190173A_006.qgd
Method File	: C:\GCMSsolution\Data\Project1\Methods\Equity5_Vanillin_Assay.qgm
Tuning File	: C:\GCMSsolution\System\Tune1\Tuning Report 21Aug2019.qgt

20190173-02 C:\GCMSsolution\Data\2019\20190173A_006.qgd



Peak Report TIC

Peak#	R.Time	Area	Area%	Height	Height%	Base m/z	Name
1	5.994	96103	0.28	53312	0.66	45.05	1,2-Propanediol (CAS) Propylene glycol
2	8.545	115636	0.33	58422	0.72	43.05	2,4-Dimethyl-1-heptene
3	15.002	26803461	77.00	4021459	49.80	105.00	Benzoic Acid
4	15.759	5288075	15.19	2667433	33.03	136.10	Naphthalene-d8
5	16.016	186671	0.54	97072	1.20	97.00	2-Furancarboxaldehyde, 5-(hydroxymeth
6	16.668	138816	0.40	70797	0.88	175.10	Benzene, 1,3-bis(1,1-dimethylethyl)-
7	19.044	101386	0.29	51762	0.64	152.05	Vanillin
8	19.845	1605607	4.61	821484	10.17	137.00	Ethyl Vanillin
9	21.390	147339	0.42	73698	0.91	120.05	2H-1-Benzopyran-2-one, 3,4-dihydro-
10	22.277	327623	0.94	159132	1.97	157.05	Ethyl citrate
		34810717	100.00	8074571	100.00		

C:\GCMSsolution\Data\2019\20190173A_006.qgd 1 / 12

Exhibit 1

CURRICULUM VITAE

PRESENT ACTIVITY Daphna Havkin-Frenkel is the General Manager of Bakto Flavors LLC (www.baktoflavors.com) and a visiting scientist in the Department of Plant Biology, Rutgers-the State University of New Jersey. Bakto Flavors is a company specializing in the production and marketing of vanilla products and other natural flavors and extracts. The research program at Rutgers University aims to understand the curing process of vanilla beans, post-harvest handling of vanilla beans, green house cultivation of vanilla including control of bean quality. In addition, she is involved in research on understanding of the biosynthetic pathway of vanillin in vanilla beans and microorganisms. Daphna has a unique, in depth knowledge the FDA regulation of vanilla and vanillin and their application to food and beverages. She has organized professional symposia and courses on Vanilla and on Natural Preservatives at Rutgers University and around the world.

Daphna is a vanilla specialist including vanilla production (field, green house and net houses). Curing, traditional and modern. Sourcing and extraction. Flavor chemistry of vanilla and vanillin, she is currently involved in consultation on the subject world wild.

EDUCATION

MBA School of Management, Rutgers - The State University, Newark, NJ 2002
Ph. D. Food Science, Rutgers - The State University, New Brunswick, NJ 1982
M.S. Microbiology/ Plant Pathology, Hebrew University, Jerusalem, Israel 1975
B.S. Plant Pathology/ Plant Physiology, Hebrew University, Jerusalem, Israel 1974

PROFESSIONAL EXPERIENCE

Biovan Group - 1989 to 2003, Director, Reporting to the President.

- Assembled and directed the Biovan Group (supervised up to 10 people at one time)
- Developing natural flavors by bioconversion and biosynthesis from biological origins such as plants, plant tissue culture and microbial systems.
- biotechnological system for the production of natural vanillin.
- Development and improvement of extraction and recovery of flavors from raw materials such as vanilla beans, flowers, roots and other plant tissues
- Development of a new process for curing vanilla beans

Research Associate - Rutgers University 1985 to 1989

- Natural products production by biosynthesis and enzymatic transformations in tissue culture
- Non - aqueous enzymology for the release of useful compounds from phytopolymers
- Novel method for regeneration by organogenesis and ebryogenesis of Asparagus culture cells with novel plant extracts

Research Scientist - Elan Chemical Company, Newark, NJ 1984

- Biodegradation of lignin by *Phanerochaete chrysosporium* for the production of natural vanillin
- Extraction, isolation and identification of flavor compounds using TLC, HPLC, GC - MS

Research Associate - Volcani Center, Bet Dagan, Israel 1976 to 1977

- Responsible for a government sponsored program for development of methods for early detection of bacterial and fungal plant diseases by physiological examination, biochemical analyses, immunological and electron microscopic techniques.

PUBLICATIONS (ONLY PEER REVIEW)

Hailian Yang, Jaime Barros-Rios, Galina Kourteva, Xiaolan Rao, Fang Chen, Hui Shen, Chenggang Liu, Andrzej Podstolski, Faith Belanger, Daphna Havkin-Frenkel, Richard A. Dixon (2017) A re-evaluation of the final step of vanillin biosynthesis in the orchid *Vanilla planifolia*. Phytochemistry

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(THIS PAPER WAS FEATURED ON THE COVER OF THE AUGUST ISSUE OF THE JOURNAL Plant **Molecular Biology)**

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Biotechnology in Flavor Production. (2016) Edited by D. Havkin-Frenkel and Nativ Dudai, Blackwell Publishing Ltd., Oxford, UK, 314 pages, 2nd edition.

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4. Havkin-Frenkel, D., Podstolski, A., Increasing vanillin yield in plant tissue culture. Patent No. 60/052606 (1997)
5. Havkin-Frenkel, D., Podstolski, A., Dixon, R.A. A vanillin biosynthetic pathway enzyme from *Vanilla planifolia*, PCT/US03/06397 or 20030070188 (2003)

CONFERENCES ORGANIZER

WHAT IS NATURAL 2016? DECEMBER 14-15, 2016 Crown Plaza Jamesburg, NJ USA

Vanilla 2015 November 5th – 6th, 2011 Crown Plaza Jamesburg, NJ USA

Vanilla 2013 November 5th – 6th, 2011 Crown Plaza Jamesburg, NJ USA

Vanilla 2011 November 9th – 10th, 2011 Crown Plaza Jamesburg, NJ USA

Vanilla 2009 Crown Plaza Jamesburg, NJ USA

Vanilla 2008 The Prized Vanilla Flavor: Old Challenges, New Opportunities, Symposium IFT Annual Meeting June 5, 2008 New Orleans, LA USA

Vanilla 2007 November 6th-8th, 2007 Forsgate Country Club Jamesburg, NJ USA

Natural Preservatives Workshop 2007 August 25-30, 2007 Antioxidant measurement workshop-Rutgers University Cook College, Department Plant Biology & Pathology New Brunswick, NJ USA

Vanilla Science and Technology Workshop 2006 August 21st-25th, 2006 Cook College, Department Plant Biology & Pathology Rutgers University New Brunswick, NJ

Natural Preservatives 2006 International Symposium on Natural Preservatives June 6th-8th, 2006 Amsterdam Marriott Hotel Amsterdam, The Netherlands

Vanilla 2005 Third International Congress: Back to the Vanilla Origin November 14-17, 2005 Hotel Americana, Veracruz, Mexico

Natural Preservatives 2005 Natural Preservatives in Food, Feed, and Cosmetics March 30th – 31th, 2005 Radisson Hotel Princeton NJ, USA

Vanilla 2004 Europe Second International Congress on the Future of the Vanilla Business September 29th-October 2nd, 2004 The Majestic Barriere Hotel Cannes, France

Vanilla Science and Technology 2004 Workshop August 20th-25th, Rutgers University Cook College, Department Plant Biology & Pathology New Brunswick, NJ, USA

A Class trip to Veracruz, Mexico 2004 August 26th-30th, Visitation of growing area and curing facilities, Papantla, Veracruz, Mexico

A working trip to Veracruz, Mexico 2004 April 19th-May 4th, Daphna Havkin-Frenkel and Chaim Frenkel Visit a Vanilla growing area and curing facilities Papantla, Veracruz, Mexico

Vanilla 2003 First International Congress on the Future of the Vanilla Business November 11th-12th, 2003 Radisson Hotel Princeton, NJ USA

Exhibit 2

Expert Witness History

1. In 2004 and 2005, I provided consulting services to parties engaged in a private insurance coverage dispute over the value of vanilla beans which were destroyed in transshipment.